

ceding table; but I shall content myself with indicating the following:—

1. The analogous muscles in the hip-joint and shoulder-joint of the same side of the body are arranged in reverse order—thus confirming the opinion of Vicq d'Azyr that the left leg should be compared with the right arm, and *vice versâ*.

2. The marsupial muscles in no respect correspond with the obturators, but find their true analogues in a muscle whose direction lies between that of latissimus dorsi and the pectorals. This muscle (wanting in the Alligator and Crocodile) is found in the following animals:—the Armadillo, the Seal, the Otter, and other animals that dig or swim.

3. The analogue of the obturators is found in the second pectoral of the birds, which acts as a levator humeri, and whose line of direction lies between the pectorals. This muscle may *possibly* be represented in the Crocodile and Alligator by the pectoral muscle extended from the first sternal rib to the posterior edge of the coracoid.

XXXVIII.—*On the peculiar Structure and Function of the Spicules of Hyalonema.* By Dr. J. E. GRAY, F.R.S., V.P.Z.S., F.L.S., &c.

ONE of the chief reasons assigned for regarding the rope-like axis of *Hyalonema* as part of a Sponge, to which some specimens have been found attached, is that it consists of spicules which are composed of silica, and formed like the spicules of sponges. Prof. Max Schultze, Prof. Wyville Thomson, and others compare them with the long filiform spicules of *Euplectella*.

Zoologists and microscopists have overlooked the importance of a very marked peculiarity in the formation of the spicules of *Hyalonema* that is not to be observed in the spicules of any kind of Sponge that I have examined or seen figured. This is the more remarkable as the peculiarity to which I refer was mentioned when I first described the genus, and is figured by Max Schultze, Brandt, and Bocage, and, indeed, by all authors who have figured the genus; but these authors have not considered why the peculiarity existed and the bearing it has on the question of the structure of the animals to which the spicules belong:

The spicules of Sponges are formed of a number of concentric layers round a central line, and they always have a perfect, more or less acute end, which is simple and formed of

coats like the rest of the body; in fact they seem to be increased in size by a layer of siliceous and animal matter being deposited on their whole surface, on the apices as well as the rest of the body.

On the contrary, the spicules of *Hyalonema* are subcylindrical, rather thicker above, and very slender at the base, formed of numerous concentric laminae round a central line; but the outer layers do not reach the ends of the spicules. The ends are truncated, and there is a succession of laminae, each terminating shorter and shorter of the top of the spicules; so that the ends of the spicules are furnished with a succession of rings, each formed by the termination of a layer of siliceous and animal matter, as is well figured in the plates of Professors Max Schultze, Brandt, and Bocage.

I believe that this difference in the structure arises from the very different functions which the spicules of the axis of *Hyalonema* have to perform in the coral from those for which the spicules of the sponges are formed in the body of those beings. In *Hyalonema* the coral is gradually being extended in height, and the spicules are extended in length, *pari passu*, to support the coral as it grows. To allow of this extension of length, the ends of the spicules are not finished off as they are in the sponges, where they are completed at once, and are only slightly thickened and lengthened to a certain limit as the sponge grows. The spicules of sponges merely form a support for a more or less massive sponge, and are of a definite size; while the spicules of the rope-like axis are continually increasing in length and thickness to support a continually growing mass of animals, which require a larger and stronger axis to support them as the community assumes the adult form. The spicules of the rope-like mass are of different thickness; and they increase in number as the axis increases in diameter, those last formed being the most slender and consisting of the fewest concentric layers.

It is to be observed that the short rugose cruciform spicules in the bark of the *Hyalonema*, which do not require to be lengthened as the coral increases in size, are formed like the spicules of sponges, and are complete in form when first deposited, and have complete ends. This difference in the structure of the spicules of the axis and of the bark, I think, goes far to confirm the theory I have propounded, that the spicules of the axis are of different structure, because they have a peculiar function to perform.

This peculiarity in the structure and function of the spicules of the axis, I think, proves that they are no part of the sponge, but a secretion of the hard flesh of the polype that surrounds

each of them and forms the mass of them, and that they are a part of the community of the *Palythoe*, and not a mere bundle of spicules arising out of the sponge.

If I understand the theory of those who regard the rope-like axis of *Hyalonema* as the spicules of a sponge, they believe that the spicules of the sponge are clustered together in the centre of the sponge, and are produced, forming an elongated columnar coil, which, according to Bowerbank, is covered with a skin forming part of the sponge, and according to Professors Brandt and Max Schultze is covered with a coat of parasitic *Palythoe*. If either of these theories is true, the spicules should be of the same form and structure as the spicules of sponges, and complete and acute at each end.

I have shown that the spicules of the coil are not formed as the usual spicules of Sponges, but have their ends, and especially their upper or distal ends, always in an incomplete state of development, and that they are constantly being lengthened by the addition of coats to the end of each of the layers of which the spicules are composed. I think we may conclude that the spicules are produced or secreted by the coat of corium that covers them (and this coat has, I think, been most indisputably proved to be formed by the community of animals allied to *Palythoa*), and therefore that the axis is not a part of the sponge, but the proper secretion of the Palythoan animals.

Prof. Max Schultze, though he figures this structure (t. 2. f. 4 & 5), appears not to understand its importance; for he compares it to a fusiform spicule with a central spherical knob that he found in the sponges which are furnished with some spines which are directed towards the centre. But this is evidently only a variety (and one I have not seen) of the stellate spines figured on tab. 4. f. 2, 4, 7, 8 & 9, though in these the spines on the rays are all directed towards the tips. These spinulous spicules are all perfect and acute at the tips, and are not truncated and growing at the end like the spicules of the coil of *Hyalonema*.

Prof. Brandt's figures of the spicules of *Hyalonema*, on tab. 2. f. 12, 13, 14, & 15, much more accurately represent the structure; but it is to be remembered that figs. 12 & 13 represent wrong ends of the spicule upwards; that is to say, the slender end of the spicule is the one that is immersed in the sponge, and the blunt truncated lower end, as it appears in these plates, is the end of the spicule that is furthest from the place of attachment and which is being extended to accommodate itself to the increased height of the bark or community of polypes. And tab. 4. f. 14 also well represents the coat of which the spicules

are composed, and the sheath of fleshy matter or corium with which each is surrounded. The existence of this sheath, which is of the same structure and substance as the inner layer of the bark, I have always regarded as a proof that the spicules were formed by the community of *Palythoa* that compose the bark or corium.

The long free filamentous spicules of the *Euplectella*, which are regarded by Dr. Max Schultze and Prof. Wyville Thomson as most resembling in form the spicules of the axis of the *Hyalonema*, have an acute simple tip, or have the tip armed with three or more recurved hooks, as figured by Bowerbank. It is curious how Dr. Max Schultze, who has figured the peculiar structure of the spicules of *Hyalonema*, and must have seen the spicules of the *Euplectella* furnished with hooks, could have thought of uniting the two genera into a group, which he called *Lophiospongia*; for nothing can be more distinct than the structure, form, and use of the spicules of these two genera belonging to orders of animals of such different degrees of organization.

#### BIBLIOGRAPHICAL NOTICES.

*Coleoptera Hesperidum, being an enumeration of the Coleopterous Insects of the Cape Verde Archipelago.* By T. VERNON WOLLASTON, M.A., F.L.S. 8vo. London: Van Voorst, 1867.

How far Mr. Wollaston is warranted in applying the term Hesperides to the southernmost cluster of the North Atlantic islands is a question which we must leave to the classical student for decision; perhaps they have as good a right to the title as any others. But to the entomologist, since the publication of the book whose title is given above, the Hesperides will most certainly be identified with the Cape Verde Islands, seeing that Mr. Wollaston's visit to them has enabled him to present his brother entomologists with a treasure of higher value than any amount of golden apples ever guarded by the most terrible of dragons.

The materials for the 'Coleoptera Hesperidum' have been chiefly collected by Mr. Wollaston himself, during a visit to the little archipelago in Mr. Gray's yacht. Mr. Gray, Mr. Hamlet Clark, and Mr. Lowe had also previously landed on some of the islands; and Mr. Wollaston acknowledges the receipt of specimens from some other gentlemen; but the arid nature of the group, in some of the islands of which rain scarcely ever falls, renders the most careful working unproductive, and accordingly the whole number of species obtained from all sources amounts only to 278. This number might perhaps be slightly increased by an investigation of the three eastern islands of the group, which Mr. Wollaston did not visit; but the very name of "Salt Islands" applied to these seems to indicate that pro-